CLAIMS:

1. A method for examining an object, which method includes the steps of:

a) exciting the object by means of mechanical oscillations,

b) measuring the variation in time of the excursion from the rest state of voxels of the object which are subject to the waves caused by the oscillations in the object,

c) determining the non-linear distortions from the variation in time of the excursion, and

d) evaluating the non-linear distortions.

2. A method as claimed in claim 1, in which the evaluation comprises the formation of an image representing the extent of the non-linear distortions.

3. A method as claimed in claim 2, which method includes the steps of:

a) exciting the object by means of temporally periodically, preferably sinusoidally varying mechanical oscillations,

b) exciting the nuclear magnetization in the object in conjunction with a magnetic gradient field (G_1, G_2) which is synchronous with the mechanical oscillations, and receiving the MR signals arising in the object in order to form an MR phase image, the variation in time of the gradient field being chosen to be such that the MR signals are determined by excursions at the fundamental frequency as well as by excursions at at least one higher harmonic of the fundamental frequency,

c) repeating the step b) a number of times while varying the direction of the gradient of the gradient field and/or the phase difference between the mechanical oscillations and the gradient field in order to form further phase images,

d) determining the amplitude of the excursion of the spins at the fundamental frequency on the basis of the MR phase images,

e) determining the amplitude of the excursion of the spins at the higher harmonics of the fundamental frequency on the basis of the MR phase images, and

f) forming an image which is dependent on the ratio of the amplitudes.

4. A method as claimed in claim 3, in which the magnetic gradient field (G_1, G_2) comprises two separate, sinusoidal oscillations having half the period duration of the mechanical oscillations, the distance in time between said oscillations amounting to one quarter of the period duration of the mechanical oscillations.

5. A method as claimed in claim 4, in which a refocusing RF pulse acts on the examination zone between the two sinusoidal oscillations.

6. A method as claimed in claim 3, which method includes the steps of:

a) additionally calculating the elasticity in the examination zone, and

b) evaluating the values of distortions and elasticity determined for the same voxel.

7. An arrangement for carrying out the method claimed in claim 1 by means of an MR apparatus, a mechanical oscillation generator, an evaluation unit, a generator which determines the variation in time of magnetic gradient fields, and a control unit which controls the MR apparatus, the generator, the oscillator and the evaluation unit and is programmed in such a manner that the following steps are carried out:

a) exciting the object by means of temporally periodically, preferably sinusoidally varying mechanical oscillations,

b) exciting the nuclear magnetization in the object in conjunction with a magnetic gradient field (G_1, G_2) which is synchronous with the mechanical oscillations, and receiving the MR signals arising in the object in order to form an MR phase image, the variation in time of the gradient field being chosen to be such that the MR signals are determined by excursions at the fundamental frequency as well as by excursions at at least one higher harmonic of the fundamental frequency,

c) repeating the step b) a number of times while varying the direction of the gradient of the gradient field and/or the phase difference between the mechanical oscillations and the gradient field in order to form further phase images,

d) determining the amplitude of the excursion of the spins at the fundamental frequency on the basis of the MR phase images,

e) determining the amplitude of the excursion of the spins at the higher harmonics of the fundamental frequency on the basis of the MR phase images, and

f) forming an image which is dependent on the ratio of the amplitudes.

8. A computer program for a control unit which acts on an MR apparatus, an oscillation generator and an evaluation unit in order to carry out the method as claimed in claim 1 as follows:

a) exciting the object by means of temporally periodically, preferably sinusoidally, varying mechanical oscillations,

b) exciting the nuclear magnetization in the object in conjunction with a magnetic gradient field (G_1, G_2) which is synchronous with the mechanical oscillations, and receiving the MR signals arising in the object in order to form an MR phase image, the variation in time of the gradient field being chosen to be such that the MR signals are determined by excursions at the fundamental frequency as well as by excursions at at least one higher harmonic of the fundamental frequency,

c) repeating the step b) a number of times while varying the direction of the gradient of the gradient field and/or the phase difference between the mechanical oscillations and the gradient field in order to form further phase images,

d) determining the amplitude of the excursion of the spins at the fundamental frequency on the basis of the MR phase images,

e) determining the amplitude of the deflection of the spins at the higher harmonics of the fundamental frequency on the basis of the MR phase images, and

f) forming an image which is dependent on the ratio of the amplitudes.